# My NASA Data - Lesson Plans

Data Literacy Cube: Graph Data using Soil Moisture Data

OPeNDAP URL: https://mynasadata.larc.nasa.gov/thredds/dodsC/las/soil_moisture/data_usr_local_fer_data_data_soil_moisture.nc_Count_Globe_init_soilw.jnl
DATA SET: Soil Moisture
VARIABLE: Monthly Mean Soil Moisture (CPC) (mm)
LONGITUDE : 115.2W
LATITUDE : 35.2N
- Subsampled 3 in T

LAS 8./Ferret 7.3 NOAA/PMEL
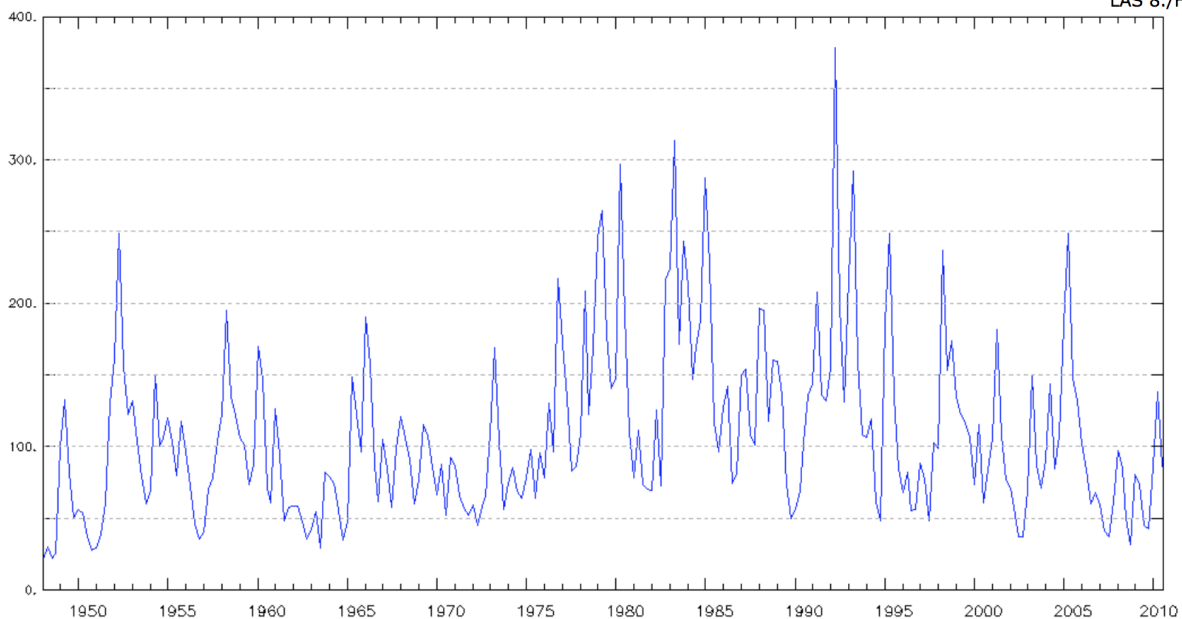
Purpose

Use the Data Literacy Cubes to guide students' exploration of data to enrich their observations and inferences. This is a flexible resource that may be used with a variety of graphical representations of data. This activity requires a graph for students to evaluate.   For the purposes of this lesson, students will analyze *a graph of the Monthly Soil Moisture of the Mojave National Preserve, south of Las Vegas, NV shown in mm.*

Learning Objectives

- Observe and interpret physical characteristics of the Earth System using graphs of NASA data
- Characterize the independent and dependent variables
- Analyze graphs values with statistics
- Research how the phenomena changes of time and space
- Identify relationships among variables
- Summarize trends in the data

Essential Questions

- How are the data represented in the graph?
- How do we identify changes in these data?
- How does a change in the independent variable affect the other variable?
- What relationships do you claim exists among these variables?

Materials Required

- 1 Graph Cube per group/student
- 1 matching differentiated Graph Cube Question Sheet
- 1 Sheet of paper per student
- Pencil
- Graph

Teacher Preparation:

Print copies of the cube on cardstock and cut out. Assemble the cube with glue. Note: consider laminating after you cut these out for multiple uses. (Gaming dice may be substituted for the cubes.) Also, print off copies of the differentiated Graph Cube Questions. Distribute to students for group or independent work.

Technology Requirements

- Standalone Lesson (no technology required)
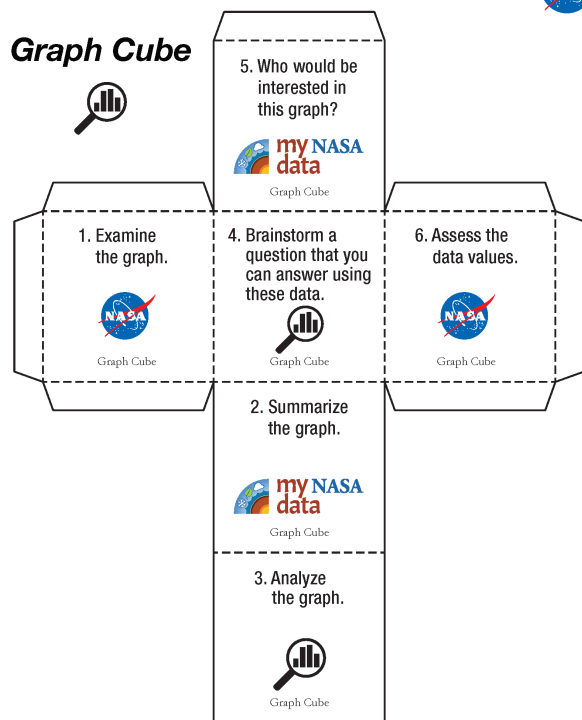
Teacher Background Information

For more information about the procedures for accessing MND data on the Earth System Data Explorer, visit our [YouTube page](#) and watch the tutorials.

Procedure

1. Distribute one Graph Cube per group, as well as the related differentiated Graph Cube Questions and the graph.
2. Students roll the cube and find the matching question on the Graph Cube Question sheet.
3. Answer one question found under matching question on a sheet of paper, labeling the question with the number and letter of the question.
4. Repeat Steps 2-4 until at least 10 are answered.

Graph Cube

5. Who would be interested in this graph?

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Graph Cube

1. Examine the graph.

NASA

Graph Cube

4. Brainstorm a question that you can answer using these data.

Graph Cube

6. Assess the data values.

NASA

Graph Cube

2. Summarize the graph.

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Graph Cube

3. Analyze the graph.

Graph Cube

Graph Cube Questions

1. Examine the graph.
  A. The title tells me _____.
  B. The bottom of the graph is the ___ axis. The variable is _____.
  C. The left side of the graph is the ___ axis. The variable is _____.
  D. The time frame for the data is _____ to _____.

2. Summarize the graph.
  A. The x axis shows the *(independent/dependent)* variable.
  B. The y axis shows the *(independent/dependent)* variable.
  C. The data _____ (increase/decrease/follow a pattern). Explain.

3. Analyze the graph.
  A. _____ caused the change.
  B. The variable that changed as a result of something else changing is _____.
  C. If ____ *(increases/decreases/stays the same)*, then____ *(increases/decreases/stays the same)*.
  D. The numbers on the graph show _____.

4. Brainstorm a question that you can answer using these data.
  A. How does...?
  B. I wonder...
  C. How is _____ the same as _____? Different from _____?
  D. How many _____?

5. Who would be interested in this graph?
  A. I think ___ (i.e. farmers, snow skiers, etc.) would be interested in this graph.
  B. These data are important to the _____ community because _____.

6. Assess the data values.
  A. The label on the x axis is _____. The label on the y axis is _____.
  B. The unit for the x axis is _____. The unit for the y axis is _____.
  C. The scale for the x axis is _____. The scale for the y axis is _____.

A

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📊 *Graph Cube Questions* 🔍

1. Examine the graph.
   A. The variable on the x axis is _____. It is the *(independent/dependent)* variable.
   B. The variable on the y axis is _____. It is the *(independent/dependent)* variable.
   C. The value of the independent variable affects the dependent variable by _____.

2. Summarize the graph.
   A. The variable that changes as a result of another variable changing is ____.
   B. The variable that causes the change is _____.
   C. As the independent variable ___ *(increases/decreases)*, the dependent variable ___ *(increases/decreases/stays the same)*.
   D. The time frame represented in the graph is from _____ to _____.
   E. The data _____ *(increase/decrease/follow a pattern)*. Explain.

3. Analyze the graph.
   A. Write a hypothesis about the two variables to explain the graph. If __, then __.
   B. The quantitative evidence that supports my testable statement is _____.

4. Brainstorm a question that you can answer using these data.
   A. How does...? How many...?
   B. I wonder...
   C. How is _____ the same as _____? Different from _____?

5. Who would be interested in this graph?
   A. I think _____ (i.e. farmers, snow skiers, etc.) would be interested in this graph.
   B. These data are important to the _____ community because _____.

6. Assess the data values.
   A. The label on the x axis is _____. The label on the y axis is _____.
   B. The unit for the x axis is _____. The unit for the y axis is _____.
   C. The scale for the x axis is _____. The scale for the y axis is _____.

B

📊 *Graph Cube Questions* 🔍

1. Examine the graph.
   A. What variable is represented on the x-axis? What is the range of values?
   B. What variable is represented on the y-axis? What is the range of values?
   C. What are the units of measurement for the x and y axes?
   D. If this graph represents a geographic location, identify it on a map or globe.

2. Summarize the graph.
   A. Do the data repeat in recognizable ways? Explain.
   B. What kinds of patterns or trends do you see in the distribution of the data?
   C. How do the patterns you see in the graph relate to other things you know?

3. Analyze the graph.
   A. Describe the relationship between the variables: positive, negative, or none.
   B. Brainstorm one variable that you predict to be directly proportional.
   C. Brainstorm one variable that you predict to be inversely proportional.

4. Brainstorm a question that you can answer using these data.
   A. Ask a question beginning with how, what, where, when or why.
   B. I wonder...
   C. Form a hypothesis using the data on the graph. If ____, then ____.

5. Who would be interested in this graph?
   A. Brainstorm who would be interested in the data presented in this graph *(i.e., farmers, snow skiers, etc.)*.
   B. Why do you think these data are important to this community?

6. Assess the data values.
   A. What is the numerical range of the data? Mean? Median? Mode?
   B. How is the mean different from the mode?
   C. Are there any outliers? If so, what are they?

C

📊 *Graph Cube Questions* 📊

1. Examine the graph.
   A. The bottom of the graph is the ___ axis. The variable is _____.
   B. The left side of the graph is the ___ axis. The variable is _____.
   C. The time frame for the data is _____ to _____.
   D. The title says _____. It means _____.

2. Summarize the graph.
   A. The x axis shows the *(independent/dependent)* variable.
   B. The y axis shows the *(independent/dependent)* variable.
   C. The data ___ *(increase/decrease/follow a pattern)*. I know this because ___.

3. Analyze the graph.
   A. The independent variable, _____, caused the change.
   B. The dependent variable _____ changes when the independent variable changes.
   C. If _____ *(increases/decreases/stays the same)*, then_____*(increases/decreases/stays the same)*.
   D. The numbers on the graph show _____.

4. Brainstorm a question that you can answer using these data.
   A. How does...? I wonder...
   B. How is _____ the same as _____? Different from _____?
   C. If _____, then _____.

5. Who would be interested in this graph?
   A. I think ____ *(i.e. farmers, snow skiers, etc.)* would be interested in this graph.
   B. These data are important to the _____ community because _____.

6. Assess the data values.
   A. The label on the x axis is _____. The label on the y axis is _____.
   B. The unit for the x axis is _____. The unit for the y axis is _____.
   C. The scale for the x axis is _____. The scale for the y axis is _____.

D

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